St. Paul District Recreation Cost Benefit Analysis,
Roseau Flood Damage Reduction Project, Roseau Minnesota.

GENERAL

The city of Roseau, Minnesota is located in Roseau County, about 12 miles south of the Canadian Border. The largest city in the county, Roseau is a regional hub, serving over 60,000 people. A small farming and manufacturing community with a population of 2,756[1], Roseau is situated about 100 miles north/east of Grand Forks, ND. The nearest large city is Winnipeg, also about 100 miles distant to the north/west. The region is almost entirely agricultural, with the population dispersed across a wide area–however—the study area is located near the western edge of a vast coniferous forest with literally thousands of clear lakes and streams and abundant outdoor recreation; it includes 120 miles of the U.S./Canada border.

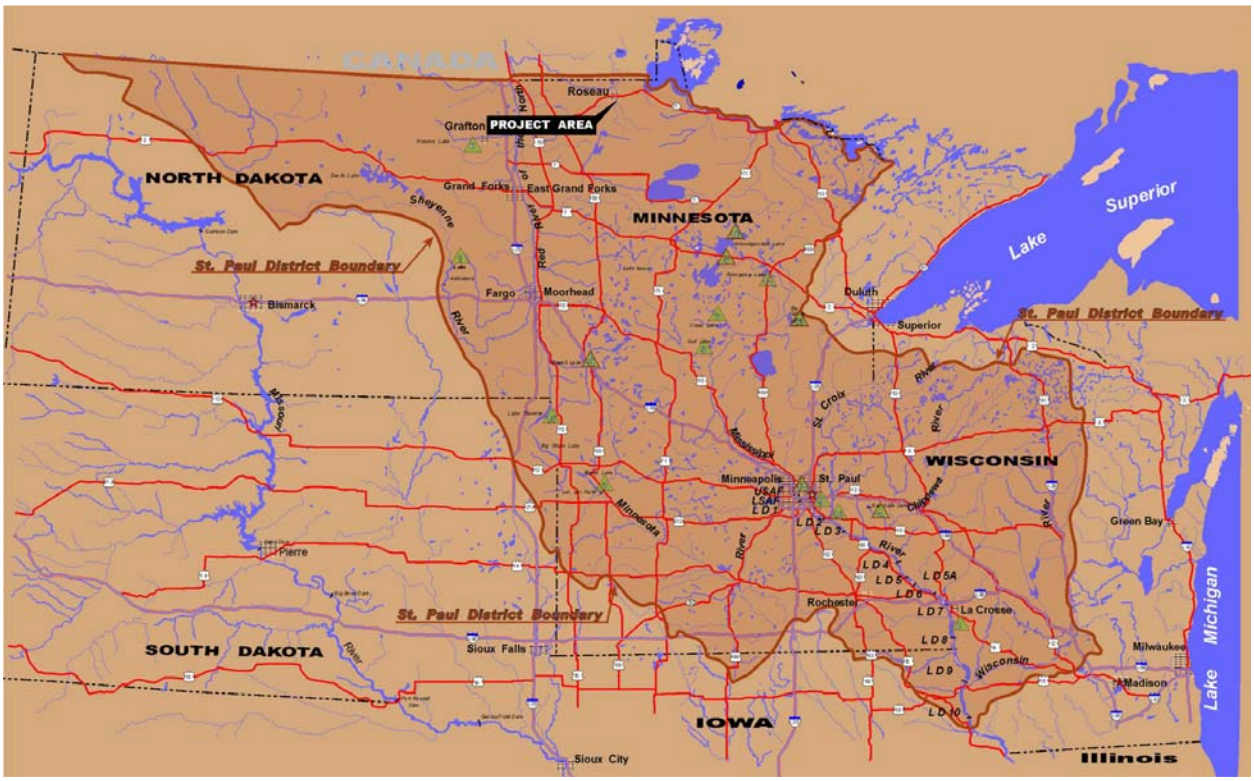

Figure 1—Project Location Map

Roseau City is an exceptional example of rural Americana with an established and healthy downtown business district at its core and service businesses spaced along the main highway. There is a noticeable absence of major-chain discount retailers. The city encourages development within the community with several economic programs. The official website for Roseau describes the city as "…the friendliest place in America…the most important community asset is the people who live within the city." Roseau is small town, "Heartland" America, with quiet residential streets bordered by large trees. The Roseau River winds through the city, running adjacent to the downtown business section. The city's small town persona is retained

[1] *2000 US Census*

within its friendly, industrious people, physical environment, and location—the Midwest agricultural belt.

The principal transportation route serving Roseau is Minnesota State Road (SR) 11 which connects to Interstate Highway 29 about 60 miles to the west. Although regular air service is not scheduled to the city, Roseau airport is the local hub for air charters and private craft.

Figure 2—Study Area Locator Map

With a 15 percent population growth during the 1990s, Roseau's economy is a definite success story amidst the general population and economic decline of agricultural communities in the Midwest. Much of the city's success comes from its diversified economy. Polaris Industries, manufacturer of the Polaris snowmobiles and Ranger all terrain vehicles (ATV), is based in Roseau and employs about 2,000 people locally. The company is second only to Honda in the worldwide sales of ATVs.

Marvin Windows, the world leader in made-to-order windows and doors, is based in Warroad, MN, 21 miles to the east on SR 11—a 15-20 minute commute. Marvin employs almost 3,000 workers. Both of these manufacturing facilities are heavily dependent on the regional workforce, as Warroad's population is only 1,700 people. In addition to agriculture, these and many smaller industries provide a substantial income base for numerous service and retail businesses throughout the Roseau area. Due to the success of area industries, career opportunities are abundant in the Roseau region.

The region's weather is typical of the upper Great Plains. The average temperatures for the summer months range from a low of 57.5 degrees Fahrenheit (F) to a high of 84.5 degrees F. The winter months' average temperatures range from a low of 5.9 degrees F to a high of 29.8 degrees F. The annual mean precipitation is 30.75 inches, and the annual mean snowfall is 53.3 inches. Longer winters in these northern climates prescribe added emphasis on winter recreation and compatible activities.

The city lies in the dry lakebed of Glacial Lake Agassiz, a very large prehistoric lake formed by the melting glaciers of the last of the continental glaciations, about 12,000 years ago. As a result (as with most lakebeds), the landscape is generally very flat and significant topographical variation is rare. The Roseau River, part of the Red River of the North watershed, flows north through the center of the city. As with many of the rivers in this young landscape, it is narrow,

winding, and deep, with its channel cut well below the surrounding plain. There is no definable floodplain. At its normal levels, the Roseau is a very scenic river, with high banks and mature trees overhanging the slow moving waterway. Sight distances are limited by its lazily meandering nature. Within the city, a small low-head dam has been converted to a rocked rapids structure. This enables fish migration and eliminates the dangers associated with this type of dam, often called drowning machines because of their innocuous appearance and the often-fatal hydraulic undertows they create. The converted structure is a favorite spot for bank fishers. Boat access to the river is via a single one-lane boat ramp provided by the Minnesota Department of Natural Resources (DNR) located in the city park. Within Roseau, as with many river towns, the waterway has mostly been unrealized as a recreation asset by the city and much of the riverbank is privately owned.

The current flood damage reduction study advocates a flow-limiting structure (F-L structure) on the Roseau River that will divert high-water events through a diversion channel thus circumventing flood water around the city. The flood reduction effort will require significant land purchases for the diversion channel, water storage, and spoil deposition; in addition, the F-L structure necessitates construction of a light-duty bridge crossing the river. The project is designed to reduce river flows above the two-year event. Lands purchased for flood reduction features will lie vacant and unused all other times.

Adding recreation amenities to the flood reduction features will greatly increase the usability of the project by opening project lands to full-time, year around use by the public. The project has the capability to provide significant recreation opportunities to a community and region that has few passive recreation assets of the nature offered and more importantly, it will be located in an area that will benefit many of the region's residents. The Roseau City Council has endorsed adding a recreation component to the project and the draft recreation concept (Figure 3) has met with considerable approval by the public.

EXISTING RECREATION

As a relatively isolated urban outpost, especially considering its regional influence, the city has few passive or family oriented recreation resources such as the project proposes. Outdoor public recreation opportunities within the city proper include:

- Roseau City Park; its 37 acres include a small playground, rest rooms, showers, picnic facilities, open space, parking, and the DNR boat ramp. The south end of the park has 10-RV camping spaces with water and electrical hook-ups and 10-tent sites. The park provides views and access to the Roseau River adjacent to the west. It is further bounded by a county highway to the east, an established neighborhood to the north, and a 15-acre woodland to the south, next to the campground. A developing housing area is immediately to the south of the woodland.
- North Star, or Bjorkman Park is located in the SW part of town and provides quiet green space for neighborhood residents.
- Westside Park provides a playground and basketball courts for users.
- Mothers Park provides quiet green space and flower gardens for the neighborhood.
- The small Veterans Memorial Park serves the downtown, providing open green space, views of the river, and a veteran's memorial.

- Several indoor arenas provide playing areas and spectator facilities for team sports events, especially hockey.
- Fishing on the river. Anglers on the Roseau commonly catch walleye, sauger, northern pike, freshwater drum, and catfish but public access to the river is limited and difficult.

Regional recreation resources include:

- Beltrami Island State Forest covers 66,903 acres in Roseau, Lake of the Woods, and Beltrami Counties. The area provides canoeing, camping, fishing, hunting, hiking, horseback riding trails, picnicking, cross-country skiing trails and 120 miles of snowmobile trails. Recreation facilities are spread over a wide area and are accessed from Highway 11 or by local roads. State road maps show few improved access points.
- Hayes Lake State Park is located 18 miles southeast of Roseau and is accessed via Roseau County Road 4. Consisting of 3,000 acres of pines, lakes, and wildlife activity, the park is open year-round for visitor use. Activities include: camping, swimming, picnicking, hiking, biking, horseback riding, canoeing, and fishing. In the winter, the park features snow-mobiling and cross-country skiing with 12 miles of groomed trails (6 for XC-skiing and 6 for snowmobiling). The park trails connect to hundreds of miles of snowmobile trails in the adjacent Beltrami Island State Forest.
- Zippel Bay State Park, 40-miles east on Lake of the Woods has camping, a beach, winter recreation, and fishing.
- Lost River State Forest, seven miles to the northeast is 6,300 acres of unimproved wilderness forest.

There are no state or national hiking trails within the region although state operated recreation areas provide local trails. There is a loose network of state funded snowmobile trails through the region, but no ATV trails. About a dozen locations within the study area are listed in the *Pine To Prairie Birding Trail* directory, including Roseau and Lost River State Forest.

Miscellaneous recreation opportunities within the region include:

- The Roseau River Wildlife Area, 60,000 acres of natural bog and forest located 8 miles north of the city. The area provides excellent wildlife viewing opportunities.
- Agassiz National Wildlife Refuge, 30-miles south of the city.
- Lake of the Woods, 20-miles east is one of the largest lakes in North America and has a multitude of commercial recreation facilities that provide access to its 65,000 miles of shoreline, 15,000 islands, and world-renowned fishing with trophy walleye, northern pike, small mouth bass, crappie, sauger, and muskie. The lake straddles the U.S.-Canadian line and borders some of the most scenic areas in the state. Although most of the lake is located in Canada, one attraction is the Northwest Angle, the northernmost point of the lower 48 states that is not physically connected to them.
- Hayes Lake State Park's 187-acre reservoir offers bass, bluegill, crappie, and pike fishing.
- 7 miles northwest of Roseau is access to the northern leg of the Roseau River.
- Bemis Hill Creek, 20 miles southwest of Warroad, is stocked annually with brook trout.
- Tomato Creek crosses MN Highway 11 on Blueberry Hill between Roosevelt and Williams. Brook trout are stocked here annually for trout fisherman.
- Pitt Grade Trout Stream is stocked with cacheable sized rainbow, brown, and brook trout.

It is recognized that the eastern half of the study area is a sportsman's paradise, with trophy fishing and Boone and Crocket quality hunting. With thousands of pristine lakes and miles of untrammeled wilderness extending far into Canada, there is a healthy service industry within the region targeting sportsman and their families. The area north and east of Roseau has a substantial recreation/tourism industry supporting wilderness exploration, fishing, hunting, camping, and professional guide services.

PROJECT RECREATION

Project recreation design will provide four-season recreation features and amenities for the community and its visitors. Preliminary recreation design utilizes project flood control features: the diversion channel, the levees, the floodwater storage areas, and even the spoil for outdoor recreation purposes, as illustrated in Figure-3. All recreation design for the project will meet the Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas under the American with Disabilities Act of 1990 (ADA).

Project recreation features and benefits include:

- Pedestrian/bicycle trails.
- Interpretive wildlife trails.
- Recreation vehicle trails.
- River canoe trail.
- Improved river access.
- Fishing pier.
- Parking for recreation users.
- One trailhead.
- Picnic Areas.
- Rest rooms.
- Scenic overlooks.
- Interpretive trails w/overlooks.
- Birding stations
- Trees and landscaping

TRAILS: Conceptual recreation design for the project calls for three-pedestrian, bicycle multi-purpose (MP) trail loops with a combined length of about 7-miles. The MP trails will be 8-foot compacted gravel or asphalt, situated on the banks or levees of

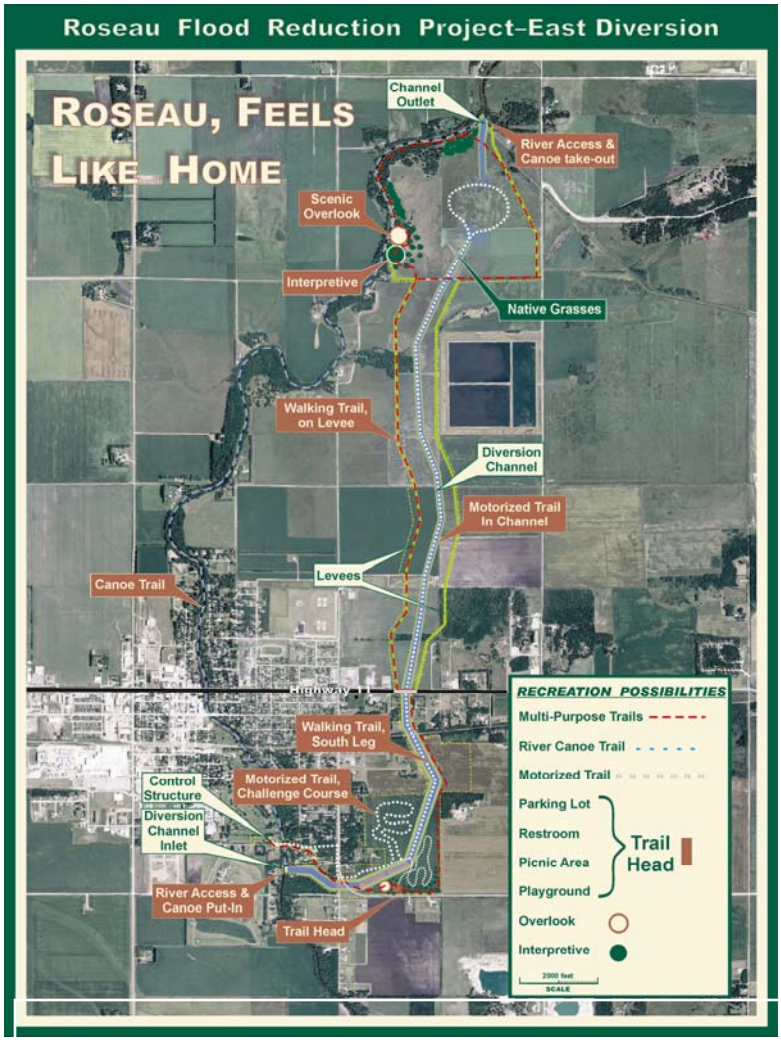

Figure 3—Preliminary Project Recreation Plan.

the diversion channel, and designed to be an interlocking trail system that will provide varying distances and aesthetic experiences to the users. The south trail will be a 2-mile segment from the river structure to Highway 11, with an asphalt surface. A high overlook will illuminate the entire project on this leg. The north trail will be a 2½ mile elevated prairie trail sited on the levee, extending from Highway 11 to the river north of town. A 2½ mile wildlife interpretive trail loop will connect to the north trail and wind along the river to the channel outlet, tying into the east-most levee and connecting back to the main trail. The wildlife trail's riverbank segment will provide scenic overlooks, interpretive areas, and birding stations. The levee trails could also connect to local gravel roads that will be truncated by the project. Using these dead-end roadway segments, the city could convert them urban trail segments or sidewalks that would connect back to Roseau. By connecting to city trails, additional short trail segments will be possible and the combined trails could be as much as 10-12 miles in length (see Figure 3). Project trails will not cross highways or busy streets. By taking advantage of flood reduction features such as the F-L structure and two diversion channel road underpasses, trail users will be able to avoid vehicular traffic on the main roads. The MP trails and levee crests will be ideal for winter use by cross-country (XC) skiers and snowshoe enthusiasts. As the head of the MP south trail loop is located in the park, this design will provide easy access for cross-country skiers and snowshoeing enthusiasts.

Winding and quiet, the Roseau River is very scenic and is considered an underused asset by city recreation staff as it has cut into the landscape and its steep banks make access difficult. The project recreation concept proposes a canoe trail on the Roseau River that will connect the upstream and downstream ends of the project. The canoe feature will utilize the reconstructed boat ramp in the park for a put-in facility, and a small parking area at the downstream (north) end to assist in take-out. The canoe trail will have a north segment of about 1.5 miles and a south segment of about 3 miles with parking at either end. These segments would connect via a short portage in town, which is necessitated by the dam. A parking area could support the trail connection and portage. The portage and parking would be supplied by the city. The dam rapids are a favorite fishing area and the support features for the canoe trail, which could include parking and access trails would greatly improve access for fishers and sightseers.

Two 12-foot wide, compacted off-road vehicle trails (ORV) are also planned. They will be suitable for ATV's, dirt and moto-cross bikes, and snowmobiles and will function all year. For safety, they will be physically separated from MP trails. Motorized trail design will be such that they can interest and entertain riders of different skill levels and abilities. A beginner's trail will be designed for the bottom of the channel, extending from a point east side of the park to an end point (yet to be decided) and back. Mild hills and easy challenges will be constructed out of the channel from spoil and designed for the novice rider as part of this trail experience. Higher levels of difficulty will be available for more experienced riders on a trail segment also designed on the spoil placement areas—the challenge trail. Innovative use of spoil will allow the trail designer to incorporate challenges and difficulties into trail topography that are not usually available in the flat terrain of this region. Several local clubs will be enlisted to help with trail design. It is understood that they will "adopt" these trails for maintenance and regulatory duties after construction. The off-road trails will also use the F-L structure as a river crossing to connect city trails to project trails. Support facilities for the ORV trails include a trailhead,

where rest rooms, potable water, picnic facilities, and parking are proposed. The ORV trail will be ideal for winter recreation by area snowmobilers and is about four-miles each direction. The proposed trailhead will also service users of the main trails.

MINNESOTA STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

The 2003-2008 Minnesota State Comprehensive Outdoor Recreation Plan (*SCORP*) states that its key uses are to:

- Establish outdoor recreation priorities for Minnesota that will help outdoor recreation and natural resource managers, the state legislature, and the executive branch make decisions about the state's outdoor recreation system.
- Set out criteria to allocate the federal Land and Water Conservation Fund investment consistent with the state's outdoor recreation priorities defined in this plan.

Within the document, seven priorities are listed and outlined for the state. Developed by a 29-member group of outdoor recreation professionals and natural resource leaders, they document and establish the priorities for protection of the state's natural resources and the development policy of state recreation projects and agendas. These priorities are based on two main principles:

- Encouraging a better, highly integrated outdoor system that balances recreation and protection of natural and cultural resources.
- Strengthening the awareness of the connection between outdoor recreation and good health.

The list of priorities is formulated to help create a balance between outdoor recreation and the preservation of natural resources throughout the state. The *SCORP* offers help and guidance to individuals and communities "so they can better understand the challenges and opportunities in front of them."

1. Protect and restore the natural resource base on which outdoor recreation depends--Minnesota's lakes, rivers, streams, wetlands, grasslands and forests.
2. Sustain Minnesota's existing outdoor recreation facilities for future generations.
3. In areas of rapid population growth, reserve prime recreation lands--such as shoreline and significant natural areas--ahead of development and provide recreation facilities such as parks, trails, and water accesses.
4. Respond to the demands of Minnesota's changing population.
5. Expand nature-based outdoor recreation experiences for youth living in urban areas through "close-by" access to natural areas.
6. Improve coordination of the recreation-related activities of governmental and non-governmental providers.
7. Understand the capacity of Minnesota's natural resources to support satisfying outdoor recreation opportunities.

Unlike past plans, the current *SCORP* does not provide hard data such as demand, needs, usage, or participation rates. As a result, data used in this study is gleaned from past *SCORP*S, Corps planning documents, and-or local land use plans, then extrapolated.

RECREATION BENEFITS ANALYSIS

Population Market Area

The identification of a market area for this study presents some unique problems. The usual practice for recreation market area determination is to assume a 1-hour driving distance, or 60 miles, for the area of influence in a rural area, modified by influencing factors, usually other (competing) recreation facilities, or difficulty of access, say a large body of water. Metropolitan areas use a ½ hour driving time, assuming there are close-in duplicate facilities and ease of access in large cities. Neither of these approaches is accurate with Roseau. The city is a small urban development in the center of remote rural area, but with a market area that is severely truncated. The Canadian border is 12 miles north of the city, and Lake of the Woods, a large body of water about 70 miles wide, is only 20 miles to the east. Further, the city of Winnipeg, Manitoba, population about 700,000, and Grand Forks, North Dakota, population over 50,000 are each about 2 hours distant. Considering the isolated nature of the project area and the extended travel times common to the rural Midwest, this study will assume the five northwestern Minnesota counties as the area of influence: Roseau, Lake of the Woods to the east, Kittson to the west, Marshall to the southwest, and Beltrami to the southeast. Even though almost 50 percent of the study area lies in Canada, the study will not include that part of Manitoba that lies within the market area zone or be influenced by the considerable numbers of Canadians that visit the region although Canadian economic influences and tourism are discussed in the following paragraphs as they certainly affect and influence the local and regional economy.

The five northwestern counties of Minnesota, to which Roseau is central, have a population of about 76,000 people. The great majority of these people live outside of urban areas or in other much smaller towns; e.g., Baudette, the county seat of Lake of the Woods County has a population of 1,100[1]. A significant and interesting aspect of rural life is that people in remote rural areas tend to shop and congregate on specified days, commonly called "Town Night." Town Night (usually a weekday) can be a significant social, economic, and recreational factor in rural hub cities such as Roseau and can easily double the city's population for the evening. Most rural hub cities host community and regional events to take advantage of Town Night and it has a positive effect on recreation values. In addition, Canadian commerce, tourism, and industry are substantial contributors to regional economics.

Minnesota and Canada traded $9.8 billion in 2003, with $603 million in Minnesota agricultural products. Almost 1-million people crossed from Canada to Minnesota in 2003 using the four small border crossings in the study area: Baudette, Pinecreek, Roseau, and Warroad. The U.S. Department of Commerce states that Minnesota had about 22 million tourists (total) in 2004. The Minnesota Department of Employment and Economic Opportunity states that 22 percent of overnight visitors to the state are to the North Central West region. University of Minnesota research shows the average travel party (five people) spends $165 a day. This translates into millions of tourist dollars annually for the region and does not include cross-border day trips.

Although many of the towns and counties of rural Minnesota are slowly losing population, there are exceptions, and Roseau is one of them. With a diverse economy, great quality of life, and

[1] *2000 U.S. census*

small-town Heartland persona, the city's growth has been steady over the last 35 years. The 2000 U.S. Census revealed that community growth in the potential market area for the project ranges from loss of population in the most rural areas, to a 2% growth rate in the larger cities. Table - 1 provides a 50-year extrapolation of growth within the region; base data are taken from 1990 and 2000 U.S. Census information.

Table - 1—Area of Influence Population

Place	Base Population		Change*		Estimated Change[1]		
	1990[1]	2000[1]	Persons	Percent	2010	2020	2055
Roseau County	15,026	16,338	1,312	8.1	17765	19,316	24830
Marshall County	10,993	10,155	-838	-7.6	9381	8666	6831
Kittson County	5,767	5,285	-482	-8.4	4843	4439	3416
Lake of the Woods Co.	4,076	4,522	446	10.9	5017	5566	7600
Beltrami County	34,384	39,650	5,266	15.3	45722	52735	80,850
REGIONAL TOTALS	**90,147**	**95,951**	**5,804**	—	**82,728**	**92,742**	**125,577**
City of Roseau	2,396	2,756	360	2%	3,170	3646	5549

**Population from 1990 to 2000.*

Market Area Zone

Considering the paucity of passive outdoor recreation available to the population within the region, the rural nature of the area, and the lack of recreation amenities associated with the project area, it is felt that the market area zone for this project would be the five northwestern counties of the North Central West region, with strong influences from Canadian visitors and tourists. The 1990 Minnesota *SCORP* does not support this assumption however, stating, "…nearly three-fourths of Minnesotans' recreation time is spent within a half hour of home." Considering that three-fourths of the state's population lives in, or very near, a major urban area, taken as an average this might very well be true; however, it is not true for those in the "outstate" minority that live outside the urban centers of the state. Therefore, for the reasons stated above, and for the purposes of this study, the market area zone of project-supported recreation is defined as those areas that are accessible within a one-hour drive of the project, excepting Canada. Realistically, in consideration of the remoteness of the area and Roseau's importance as a regional economic hub, Canadian visitors will most certainly affect actual visitation rates; however, they are not included in the numerical assessment of this study. The percentages of each county's population conservatively estimated to be within this area are shown in Table-2 and are considered the potential users of project recreation. When considering its small size, and its importance to the region, the community of Roseau is expected to contribute 50% of the recreation participants with the other market area population supplying the remainder.

[1] *Linear extrapolation of 1990-2000 U.S. census figures, assuming a constant rate of change.*

The time periods for available recreation data and population estimates for this study do not coincide (15-years vs. 20-years, respectively). Population estimates shown in Table - 2 have been modified to 15-year intervals for the project market area zone population estimate.

State Comprehensive Outdoor Recreation Plans have gotten away from tables and charts of usable data, as previously discussed. Currently, they present textural accounts of priorities and principles, etc.; participation assessments and activity rates are rare. As the USACE cost benefit analysis calls for assessment based on numerical values, much of the data contained herein is either extrapolated from old studies or based on professional assessment.

Table - 2—Project Market Area Population (Figure 2)

Counties Affected by Project Recreation	Percent within Market Area*	Year 2000	2015	2030	2055
Roseau County	100	16338	18541	20881	24830
Marshall County	40	3,808	3383	3003	2573
Kittson County	50	2537	2034	1952	1640
Lake of the Woods Co.	100	4522	5292	6173	7600
Beltrami County	20	7930	10574	12161	16170
POPULATION TOTALS		**35,135**	**39,824**	**44,170**	**52,813**

**Estimated percent of county within the project market area.*

Participation and Demand

No local usage data were available to use in planning participation for the project. Participation rates are taken from the *1990 Minnesota SCORP "Minnesotans' Outdoor Recreation Hours per Capita, 1985"* pie chart for the most part. Canoeing and picnicking are not broken out as separate activities in the document and have been lifted from previous studies, as noted. Participation rates for some recreation activities that are not listed in the *Minnesota SCORP* are available in the *1995 North Dakota SCORP*. ND (SCORP) Region 4 is the same Agassiz Lake Plain physiographic region and is part of the same Upper Midwest agricultural zone as the study area. ND border is about 70 miles to the west. This region is very homogenous, including weather, rural-ness, land types, etc., even to being situated on the same dry lakebed. Minnesota rates are adjusted per estimated length of participation, e.g., biking = 2 hours per occasion (for this study) then extrapolated across the project timeline using the *1994 SCORP* "*Increase in Minnesotans' Outdoor Recreation Hours in Minnesota by Activity, 1985-2000*" pie chart. ND numbers are from the *1995 SCORP, Table 5.1 "Projected Total Days of Resident Participation"* chart and extrapolated using *Table 5.3 "Changes in Annual Per Capita Days of Participation."* When data for recreation types are inconsistent between SCORPS, the regional model is used, as it will more accurately depict usage; e.g., walking (ND participation/increase better reflects participation in northern rural areas than does MN).

Local elected officials, citing expressed community recreational concerns, have voiced a need to have more usable open-space for non-consumptive recreation. This concern was expressed as

very desirable. In addition, additional safe access to the river would benefit the recreation community. The proposed recreation activities that are allowable and compatible with this project satisfy their criteria and would be a sustainable recreation asset for the community.

Introducing this large variety of low-cost recreation features into this isolated rural region produces very high cost-benefit ratios. This is a result of several factors:

- The lack of existing passive recreation—of the types offered by the project—within the city, other communities within the market area, and the rural region as a whole.
- The low cost of the proposed recreation features.
- The distance and rarity of like recreation features within the region.
- The quality of the expected recreation experience.

Table - 3—Participation Rates by Recreation Activity.

	Rate of Increase	SCORP	2000	2015	2030	2050	Information Source
Walking/Jogging	13%	19.94	22.53	25.46	28.77	32.51	1995 ND *SCORP*
Canoeing*	5%	0.14	0.15	0.15	0.16	0.17	1994 MN *SCORP*
Picnicking**	1%	3.07	3.07	3.32	3.87	4.51	EGF DDR
Nature Study	6%	9.0	9.54	10.11	10.72	11.36	1994 MN *SCORP*
Fishing	14%	6.75	7.70	8.77	10.00	11.40	1994 MN *SCORP*
X-C Skiing***	0.07%	.32	.32	.32	.32	.32	1995 ND SCORP
Bicycling	6%	13.96	14.80	15.69	16.63	17.62	1995 ND *SCORP*
ATV Riding[1]	NA	2.83	3.54	4.97	6.99	10.99	1995 ND *SCORP*
Snowmobiling***	-0.1%	2.67	2.67	2.67	2.67	2.67	1995 ND *SCORP*

**1990 rate from Rochester Economic Analysis, rate of increase (boating) from SCORP.*
*** From the East Grand Forks 1998 DDR. Picnicking participation rates are not constant.*
****Less than 1% is considered no change.*

Trails:

Trails are by far the most requested and used recreation feature in both North Dakota and Minnesota. There are no dedicated walking or biking trails in the city or region. There are city sidewalks and shared (with autos) bike paths.

- The construction of ±7-miles of multipurpose trail in an area where dedicated walking trails are nonexistent has met with approval and excitement from the community.
- The canoe trail, if completed, will act to improve access to the river for other recreationists and is a much-desired feature.
- Motorized trails, especially snowmobile, are available in the region; however, the idea of having a dedicated trail system locally available for young riders has met with considerable enthusiasm by the community.

As the recreation season varies according to the type of trail activity, see Table - 4 for participation rates.

[1] *ATV rate of increase is not available. National ATV sales for 1999-2000 indicate increases of 11% to 29%. This study will use the average sales of 12% for the period 1993-1998 (Wall Street Journal).*

Picnic and Playgrounds:
Picnicking is an amenity that is well duplicated by existing recreation within the city park system. Early design places a small picnic area on the outskirts of town, adjacent to trails and paved roads.

The standard picnicking season of 90 days applies with 30 percent estimated use on weekdays, 70 percent weekend activity ratio.

Nature Study:
The region, with its abundant water resources, is an important part of the central flyway, and is featured in regional birding publications. Situated in a major, natural vegetative transition zone, the region enjoys a large variety of grassland, deciduous forest, and coniferous forest animals. Trail overlooks and birding stations will be sited by local volunteers familiar with the area to maximize the potential of viewing/vantage points.

Including birding, it is assumed that nature study has a 7-month season with a 60 percent weekend, 40 percent weekday activity ratio.

Fishing:
Due to its very steep banks, much of the river is not easily accessible within or near the city. Improving river access using flood protection features is a popular feature of the design.

It is assumed that fishing has a 6-month season with a 60 percent weekend, 40 percent weekday.

Recreation Demand
Projected public use demands for proposed project-supported recreation types are given in Table-4 and methodology is explained below. The projected public use demand (in activity occasions) is calculated using:

- State recreation activity participation rates from Table-3.
- Population projections for the neighboring towns and cities, from Table-2.
- Facility design capacities using available information.
- Recreation years extrapolated from MN SCORP.
- Participation rates per activity from MN SCORP.
- Professional judgment.

The years for depicting projected growth were chosen to reflect a fifty-year project life. The annual activity occasions were converted to activity days (recreation days). This was based on the number of different activity occasions each recreational user would engage in during the day. Roseau is atypical in the motorized trail use in that Polaris is headquartered within the city and these vehicles are very popular and commonly available in the city and area. In addition, although SCORP data is used for use estimates, this type of recreation is *much* more common in the out-state areas. Actual use is expected to be considerably higher.

A Recreation Day is a standard unit of use consisting of a visit by an individual to a recreation area during a 24-hour period. People generally engage in more that one activity occasion during any given recreational site visit. A person engaged in bicycling, walking/jogging, or picnicking, etc., tends to participate in more than one activity per day; they might also sightsee, bird watch, or visit a historic site on the same day. A recreation day therefore, is considered to consist of 1.25 activity occasions/day for most types of recreation.

The participation rates shown in Table-4 reflect the steady growth this region has experienced in the last 20 years and indicate a steady increase in recreation participation per statewide forecasts.

Table - 4—Market Area Recreation Days, by Activity

	Year:			
	2000	2015	2030	2055
Market Area Population:	35,135	39,824	44,170	52,813
Activities per Day:	1.25	1.25	1.25	1.25
Recreation Days:	28,108	31,859	35,336	42,250
Walking:				
Participation Rate	19.94	22.5	25.5	28.8
Activity Days/Year	560,473	716,828	901,068	1,216,800
Picnicking:				
Participation Rate	3.07	3.32	3.87	4.51
Activity Days/Year	86,291	105,771.88	136,750.32	190,548
Canoeing:				
Participation Rate	0.15	0.15	0.16	0.17
Activity Days/Year	4,216	4,779	5,654	7,182.5
Nature Study:				
Participation Rate	9.54	10.11	10.72	11.36
Activity Days/Year	268,150	322,094	378,801.92	479,960
Fishing:				
Participation Rate	7.70	8.77	10.00	11.40
Activity Days/Year	216,431	279,403	353,360	481,650
XC Skiing				
Participation Rate	0.32	0.34	0.40	0.47
Activity Days/Year	8,994	10,832	14,134	19,858
Bicycling:				
Participation Rate	14.80	15.69	16.63	17.62
Activity Days/Year	415,998	499,868	587,638	744,445

Table - 4—Market Area Recreation Days, by Activity

	Year:			
	2000	2015	2030	2055
Market Area Population:	35,135	39,824	44,170	52,813
Activities per Day:	1.25	1.25	1.25	1.25
Recreation Days:	28,108	31,859	35,336	42,250
Playground Activities:				
Participation Rate	1.55	1.65	1.75	1.89
Activity Days/Year	43,567	52,567	61,838	79,853
ATV Riding:				
1-Activity per Day	35,135	39,824	44,170	52,813
Participation Rate	3.54	3.96	4.44	4.97
Activity Days/Year	124,377	157,703	196,115	262,480
Snowmobiling:				
1-Activity per Day	35,135	39,824	44,170	52,813
Participation Rate	2.67	2.67	2.67	2.67
Activity Days/Year	93,810	106,330	117,934	141,011

Estimate of Future Usage

Lacking a comprehensive site design, Tables 5-5B, establishing site capacity is a conservative estimate based on a concept (Figure 3). Satisfactory limits on site visitation, feature conflicts, and neighborhood impacts would be established during the design phase of the proposed project. Visitation, parking, etc., will be adjusted to minimize negative social effects and over-use. The canoeing activity would provide access to about a 4½-mile reach of the Roseau River but use would be limited by the launching times rather than site capacity. The project could provide improved river/fishing access to specific areas along the Roseau but would not affect access to the entire riverbank. The motorized trails would provide a nine-mile trail loop.

Annual visitations were developed for the five trail oriented recreational activities listed below. This was calculated by multiplying (activity occasions-per-mile) x (miles of trail) x (turnover per day) x (days per season) and divided by activity occasions per day. Activity occasions per mile were based on carrying capacity guidelines in the "Optimum Recreation Carrying Capacity" developed for the U.S. Department of the Interior in 1977. The report recommends average densities of 21 to 25 bicycles per lane/per mile, 200 feet between joggers, one group of skiers every 2-½ miles, and 275 feet between ORVs. The carrying capacity report addressed general hiking rather than urban walking. Interviews were conducted for past studies (Rochester, MN) and urban walkers did not mind being as close as 10 feet, however the average distances between all types of walkers/joggers was 300 feet apart. Carrying capacity guidelines from an earlier

Minnesota SCORP suggests an average of 24 bicycles per mile, and 29 walkers/joggers per mile. To be on the conservative side, 12 bicycles per mile and 15 walkers/joggers per mile were

selected for use in Table-5. The limiting factor for canoeing is the launch facility rather than the available area. Assuming 20-minutes per launch over a 12-hour day = 36-units.

Table - 5—Project Recreation Features: Maximum Capacity and Expected Use

PROJECT RECREATION TRAILS:

	Trail Type				
	Bicycle	**Walking**	**X-C Skiing**	**Canoeing**	**Motorized**
Miles of Trail:	7	7	7	4.5	9
Users per Mile:	12	15	4	10	19
Instantaneous Capacity:	84	105	28	45	173
Turnover Rate:	8	8	7	3	3
Maximum Daily Capacity:	672	840	196	36*	518
Days per Activity Season:	180	180	180	270	365
Annual Capacity in Hours	120,960	151,200	35,280	9,720	189,216
Activity Day Factor	**1.25**	**1.25**	**1.0**	**1.25**	**1.0**
Yearly Activity Days	96,968	120,960	35,280	7776	189,216
Weekday Use (5/7)	40%	30%	20%	30%	20%
Weekend Use (2/7)	60%	70%	80%	70%	80%
Expected Activity Days	44,328	50,112	13,104	3,221	70,280

Total Maximum Activity Days, all trails: 185,877

* *Launching capacity*

RECREATION OTHER THAN TRAILS, RESOURCE CAPACITY

Activity	Available Area	Area per Unit	Supply
Picnicking	24,000 sq. ft.	40 ft.^{2}	15-tables
Fishing	3,000 linear feet	50 ft./fisher	60 fishers
Nature Study	—	—	2.5% of total use

RECREATION OTHER THAN TRAILS, DESIGN CAPACITY VALUES**

Activity	(u)= Supply of Units	(p)= People per Unit	(t)= Turnover Rate	(s)= Weeks In Season	(w)= Weekend Day Use	(y) = Seasonal Use
Picnicking	15-tables	4	2	18	30%	70%
Fishing	60-fishers	1	2	22	20%	65%
Nature Study	2.5% of total use					

***Capacity of Recreation Use in Activity Occasions = upts/wy, (see Table 6)*

To be on the conservative side it is assumed that these activity days should be used in year 2015 to allow initial use to catch up to expectations.

Table-6 shows estimated recreation site capacity from Table 5, converted to activity days. Major recreation activities that would be supported by the project show an increase over a fifty-year period, to reflect the available information. Within the *MN SCORP*, canoeing is not listed as a separate recreation activity, evidently being considered as a part of the larger boating function in hours of usage per capita and increase in recreation hours; however, canoeing is indicated as

having a 6.6% increase from 1985-1990. Fishing is indicated as a major recreation activity in both *SCORPs*, but project support for it is incidental; i.e., improving river access.

Table - 6—Estimated Annual Use, Per Site and Activity

	Activity Occasions	Conversion Factor	Activity Days
Picnicking*	10,286	1.25	8,229
Fishing*	20,308	1.25	16,246
Total Site Activities	—	—	24,475
Total Trail Activities	—	—	185,877
TOTAL OCCASIONS	—	—	210,352
Nature Study	2.5%	1.25	4,207
Total Annual activity days			**214,559**

**Capacity of Recreation Use in Activity Occasions = upts/wy—summary of Table 5 data*

Unit Day Values

Unit day values were developed for each recreational activity. This methodology relies on professional judgment to assign point values to five specific criteria:

- Recreation Experience—pertains to the availability and quality of activities on site.
- Availability of Opportunity—is specific to travel times and scarcity of activities.
- Carrying Capacity—concerns the level of site recreation development.
- Accessibility—pertains to the ease of access, specifically by automobile.
- Environmental—is specific to the aesthetic qualities of the site and surrounding areas.

The total points assigned are converted to a unit-day value, which is then applied to the estimated visitation to derive the overall benefits. The points were assigned to the criteria as outlined in Table-7. These points were then converted to a Unit Day Value using "General Recreation" point-to-value data for Fiscal Year 2005, with a range for general recreation of $3.09 - $9.28, and specialized recreation $12.56 - $36.72[1].

Point assignment for both types of recreation is assumed using parameters outlined in the memorandum and assumptions by a recreation professional. Points are adjusted, from a maximum assignment, by judgment factors set forth for each criterion. Maximum points vary according to the criteria and are shown in Table-7.

[1] Unit Day Value methodology is outlined in the *Economics Guidance Memorandum 05-05, Unit Day Values for Recreation, Fiscal Year 2005*. The table provided in the memorandum was adjusted from Table K-3-1, Federal Register Vol. 44, No. 242, p.72962, December 4, 1979, using the CPI factor.

Table - 7—Unit Day Values

CRITERIA AND (MAXIMUM POINTS)	ACTIVITY								
	Walking	Canoeing	Picnicking	Nature Study	Fishing	XC Skiing	Bicycling	Snowmobile	ATV
Recreation Experience (30)	23	20	17	17	20	20	25	15	20
Availability (18)	15	6	4	10	6	6	15	6	15
Carrying Capacity (14)	10	8	10	5	5	8	11	5	10
Accessibility (18)	18	18	12	15	10	15	18	15	18
Environmental Quality (20)	10	10	15	6	12	10	10	12	10
Total Points Assigned (100)	76	62	58	53	53	59	79	53	73
UNIT DAY VALUES	**7.79**	**6.93**	**6.68**	**6.37**	**6.37**	**6.74**	**7.98**	**6.37**	**7.61**

2005 UDV = $3.09 -$9.28, from page 16

Annual Recreation Benefits

Table-8 shows the projected recreation visitation over the life of the project; it also indicates that said recreation does not exceed present or forecasted regional needs. Note that negative (excess demand) values exist on some features that share facilities; e.g., canoeing and fishing; walking, biking, and XC skiing, etc. The design provides a positive social value in that less popular forms of recreation can also be supported and provided by the project's main features at little or no additional cost. Noting the excess demand for each *feature*, it is evident the project will provide a positive percentage of the market area recreation needs for years to come. Visitation growth of the project is tied to recreation growth as indicated by the SCORP's and the population growth expected for the region. The numbers shown may be somewhat affected by final site design, as stated earlier. Other factors that could affect these values are: changes outside of the population value ranges submitted, enlarging the recreation sites and features, additional recreation features, war, pestilence, and famine, or the addition of recreation features not supported by this project; e.g., canoe and bicycle rentals, additional boat ramps, etc

Table - 8—Project Recreation and Excess Demand

ACTIVITY TYPE	QUALIFIER	YEAR			
		2000	2015	2030	2055
Walking:*					
(Table 4)-	Market Zone Requirements:	518,560	716,828	901,068	1,216,800
(Table 5)-	Needs Met by Project Proposal:	50,012	50,012	50,012	50,012
	Unmet Regional Recreation Needs:	468,548	666,816	851,056	1,166,788
Canoeing: *					
(Table 4)-	Market Zone Requirements:	3,901	4,779	5,654	7,183
(Table 5)-	Needs Supplied by Project:	3,221	3,221	3,221	3,221
	Unmet Regional Recreation Needs:	680	1,558	2,433	3,962

Table - 8—Project Recreation and Excess Demand

ACTIVITY TYPE	QUALIFIER	YEAR			
		2000	2015	2030	2055
Picnicking:					
(Table 4)-	Market Zone Requirements:	79,838	105,772	136,750	190,548
(Table 5)-	Needs Met by Project Proposal:	8,229	8,229	8,229	8,229
	Unmet Regional Recreation Needs:	71,609	97,543	128,521	182,319
Nature Study:*					
(Table 4)-	Market Zone Requirements:	248,097	322,094	378,802	479,960
(Table 5)-	Needs Met by Project:	4,207	4,207	4,207	4,207
	Unmet Regional Recreation Needs:	243,890	317,887	374,595	475,753
Fishing: *					
(Table 4)-	Market Zone Requirements:	200,246	279,403	353,360	481,650
(Table 5)-	Needs Met by Project::	16,246	16,246	16,246	16,246
	Unmet Regional Recreation Needs:	184,000	263,157	337,114	465,404
Bicycle *					
(Table 4)-	Market Zone Requirements:	384,889	499,868	587,638	744,445
(Table 5)-	Needs Met by Project::	44,328	44,328	44,328	44,328
	Unmet Regional Recreation Needs:	340,561	455,540	543,310	700,117
Snowmobile*					
(Table 4)-	Market Zone Requirements:	93,810	106,330	117,934	141,011
(Table 5)-	Needs Met by Project:	70,280	70,280	70,280	70,280
	Unmet Regional Recreation Needs:	23,530	36,050	47,654	70,731
XC Skiing *					
(Table 4)-	Market Zone Requirements:	8,322	10,832	14,134	19,858
(Table 5)-	Needs Supplied by Project:	13,104	13,104	13,104	13,104
	Regional Recreation Needs:	-4,782	-2,272	1,030	6,754
ATV*					
(Table 4)-	Market Zone Requirements:	124,378	157,703	196,115	262,480
(Table 5)-	Needs Met by Project:	70,280	70,280	70,280	70,280
	Unmet Regional Recreation Needs:	54,098	87,423	125,835	192,200

** Denotes a multiple use feature*

Benefit Computation

Recreation benefits attributable to the proposed trail system were based on projected demand for the recreational activities listed in Table 8. These demand estimates over the period of analysis were used in conjunction with Unit Day Values developed for each of the recreational activities. The activity demand for each project year was multiplied by the appropriate Unit Day Value for

each of the recreational activities. The value of the recreational activity at each project year was converted to a present worth value using a 5 3/8 percent annual interest rate. The sum of these present worth values, by recreational activity, were converted to an average annual dollar value, given a 50-year period of analysis and a 5 3/8 percent annual interest rate. Because the other recreational benefit categories displayed no future growth in demand, the direct computational relationship of multiplying current usage projections times the Unit Day Values was used to calculate benefits. Average annual benefits for walking, canoeing, picnicking, nature study, fishing, bicycling, cross-country skiing, snowmobiling and ATV riding came to $389,600; $22,300; $55,000; $26,800; $103,500; $353,700; $77,900; $447,700; and $534,800 respectively. The total average annual recreational benefits came to $2,011,300.

Environment

The recreation plan is not expected to have any significant impacts on the environmental resources in the area. This is primarily because the recreational components will be in areas which will be disturbed by construction of the 150 foot diversion channel and associated features. The Fish and Wildlife service has reviewed the recreation plan and indicated that the recreation component of the project appears to provide neither benefit nor loss to habitat or fish and wildlife resources.